



**HARRY HERSBACH
TOOLS BV**

specialist in machining tools



KRUZ-FSL Flange body & Carbide insert


***Indexable Coolant
Drill Series***

HIGH PERFORMANCE CARBIDE TOOLS LINE

Yes® **YESTOOL Co., Ltd.**

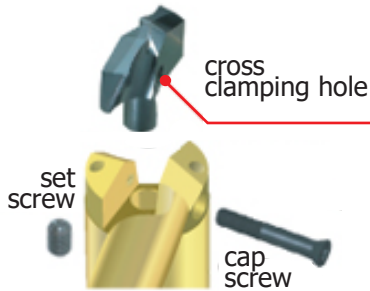


insert selection

IDP  deep hole & general purpose

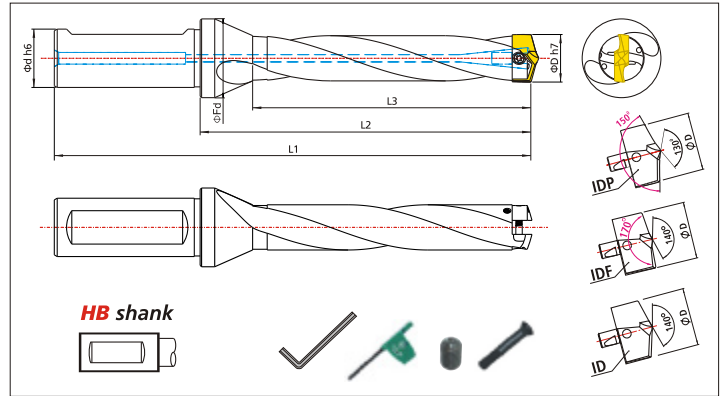
IDF  thin plate & shallow depth

ID  general purpose



KRUZ-FSL body

- ▶ Rugged flange type body to decrease vibration or chattering
- ▶ Interchangeable <IDP>, <IDF>, <ID> carbide drill inserts
- ▶ Drill body consists of premium tool steel with heat treatment
- ▶ Increased tool life by less vibration
- ▶ Internal coolant fed design



Please make required cutting depth in the □ like T, P, H, L

Hole size range	Body Code No.	Shank Size(Φd)	Cutting depth (Length x ΦD)	L1	L2	L3	Flanged dia.(ΦFd)	Insert Code No. to fit in body	Cap Screw	Torx driver	Set Screw	L-wrench
Φ8.0 ~Φ8.4	KRUZ 080 □ FSL	10.0 (HA)	T(3xD)	87	42	32	18	IDP 080, IDP 081, IDP 082, IDP 083, IDP 084	CS 080 -095 SL		None	None
			P(5xD)	103	58	48						
			H(7xD)	119	74	64						
Φ8.5 ~Φ8.9	KRUZ 085 □ FSL		T(3xD)	89	44	34		IDP 085, IDP 086, IDP 087, IDP 088, IDP 089				
			P(5xD)	106	61	51						
			H(7xD)	123	78	68						
Φ9.0 ~Φ9.4	KRUZ 090 □ FSL		T(3xD)	92	47	36		IDP 090, IDP 091, IDP 092, IDP 093, IDP 094				
			P(5xD)	110	65	54						
			H(7xD)	128	83	72						
Φ9.5 ~Φ9.9	KRUZ 095 □ FSL	T(3xD)	97	49	38	IDP 095, IDP 096, IDP 097, IDP 098, IDP 099						
		P(5xD)	116	68	57							
		H(7xD)	135	87	76							
Φ10.0 ~Φ10.4	KRUZ 100 □ FSL	T(3xD)	99	51	40	IDP 100, IDP 101, IDP 102, IDP 103, IDP 104						
		P(5xD)	119	71	60							
		H(7xD)	139	91	80							
Φ10.5 ~Φ10.9	KRUZ 105 □ FSL	T(3xD)	102	54	42	IDP 105, IDP 106, IDP 107, IDP 108, IDP 109						
		P(5xD)	123	75	63							
		H(7xD)	144	96	84							
Φ11.0 ~Φ11.4	KRUZ 110 □ FSL	T(3xD)	104	56	44	IDP 110, IDP 111, IDP 112, IDP 113, IDP 114						
		P(5xD)	126	78	66							
		H(7xD)	148	100	88							
Φ11.5 ~Φ11.9	KRUZ 115 □ FSL	L(10xD)	181	133	121	IDP 115, IDP 116, IDP 117, IDP 118, IDP 119						
		T(3xD)	107	59	46							
		P(5xD)	130	82	69							
Φ12.0 ~Φ12.4	KRUZ 120 □ FSL	H(7xD)	153	105	92	IDP 120, IDP 121, IDP 122, IDP 123, IDP 124						
		L(10xD)	188	140	127							
		T(3xD)	109	61	48							
		16.0	P(5xD)	133	85	72	21	CS120 -135 SL			M2.5x4	1.3mm

Hole size range	Body Code No.	Shank Size(Φd)	Cutting depth (Length x ΦD)	L1	L2	L3	Flanged dia.(ΦFd)	Insert Code No. to fit in body	Cap Screw	Torx driver	Set Screw	L-wrench
Φ12.5 ~Φ12.9	KRUZ 125 □ FSL	16.0	T(3xD)	111	63	50	21	IDP 125, IDP 126, IDP 127, IDP 128, IDP 129	CS 120 -135 SL	T6 Torque 0.6Nm (Max)		
			P(5xD)	136	88	75						
			H(7xD)	161	113	100						
			L(10xD)	199	151	138						
Φ13.0 ~Φ13.4	KRUZ 130 □ FSL		T(3xD)	114	66	52		IDP 130, IDP 131, IDP 132, IDP 133, IDP 134				
			P(5xD)	140	92	78						
			H(7xD)	166	118	104						
			L(10xD)	205	157	143						
Φ13.5 ~Φ13.9	KRUZ 135 □ FSL		T(3xD)	116	68	54		IDP 135, IDP 136, IDP 137, IDP 138, IDP 139				
			P(5xD)	143	95	81						
			H(7xD)	170	122	108						
			L(10xD)	211	163	149						
Φ14.0 ~Φ14.4	KRUZ 140 □ FSL	T(3xD)	119	71	56	IDP 140, IDP 141, IDP 142, IDP 143, IDP 144						
		P(5xD)	147	99	84							
		H(7xD)	175	127	112							
		L(10xD)	217	169	154							
Φ14.5 ~Φ14.9	KRUZ 145 □ FSL	T(3xD)	123	73	58	IDP 145, IDP 146, IDP 147, IDP 148, IDP 149						
		P(5xD)	152	102	87							
		H(7xD)	181	131	116							
		L(10xD)	225	175	160							
Φ15.0 ~Φ15.4	KRUZ 150 □ FSL	T(3xD)	127	77	60	IDP 150, IDP 151, IDP 152, IDP 153, IDP 154						
		P(5xD)	157	107	90							
		H(7xD)	187	137	120							
		L(10xD)	232	182	165							
Φ15.5 ~Φ15.9	KRUZ 155 □ FSL	T(3xD)	130	80	62	IDP 155, IDP 156, IDP 157, IDP 158, IDP 159						
		P(5xD)	161	111	93							
		H(7xD)	192	142	124							
		L(10xD)	239	189	171							
Φ16.0 ~Φ16.4	KRUZ 160 □ FSL	T(3xD)	132	82	64	IDP 160, IDP 161, IDP 162, IDP 163, IDP 164						
		P(5xD)	164	114	96							
		H(7xD)	196	146	128							
		L(10xD)	244	194	176							
Φ16.5 ~Φ16.9	KRUZ 165 □ FSL	T(3xD)	135	85	66	IDP 165, IDP 166, IDP 167, IDP 168, IDP 169						
		P(5xD)	168	118	99							
		H(7xD)	201	151	132							
		L(10xD)	251	201	182							
Φ17.0 ~Φ17.4	KRUZ 170 □ FSL	T(3xD)	137	87	68	IDP 170, IDP 171, IDP 172, IDP 173, IDP 174						
		P(5xD)	171	121	102							
		H(7xD)	205	155	136							
		L(10xD)	256	206	187							
Φ17.5 ~Φ17.9	KRUZ 175 □ FSL	T(3xD)	139	89	70	IDP 175, IDP 176, IDP 177, IDP 178, IDP 179						
		P(5xD)	174	124	105							
		H(7xD)	209	159	140							
		L(10xD)	262	212	193							
Φ18.0 ~Φ18.4	KRUZ 180 □ FSL	T(3xD)	142	92	72	IDP 180, IDP 181, IDP 182, IDP 183, IDP 184						
		P(5xD)	178	128	108							
		H(7xD)	214	164	144							
		L(10xD)	268	218	198							
Φ18.5 ~Φ18.9	KRUZ 185 □ FSL	T(3xD)	144	94	74	IDP 185, IDP 186, IDP 187, IDP 188, IDP 189						
		P(5xD)	181	131	111							
		H(7xD)	218	168	148							
		L(10xD)	274	224	204							
Φ19.0 ~Φ19.4	KRUZ 190 □ FSL	T(3xD)	147	97	76	IDP 190, IDP 191, IDP 192, IDP 193, IDP 194						
		P(5xD)	185	135	114							
		H(7xD)	223	173	152							
		L(10xD)	280	230	209							
Φ19.5 ~Φ19.9	KRUZ 195 □ FSL	T(3xD)	149	99	78	IDP 195, IDP 196, IDP 197, IDP 198, IDP 199						
		P(5xD)	188	138	117							
		H(7xD)	227	177	156							
		L(10xD)	286	236	215							
Φ20.0 ~Φ20.4	KRUZ 200 □ FSL	T(3xD)	157	101	80	IDP 200, IDP 201, IDP 202, IDP 203, IDP 204						
		P(5xD)	197	141	120							
		H(7xD)	237	181	160							
		L(10xD)	297	241	220							

Hole size range	Body Code No.	Shank Size(Φd)	Cutting depth (Length x ΦD)	L1	L2	L3	Flanged dia.(ΦFd)	Insert Code No. to fit in body	Cap Screw	Torx driver	Set Screw	L-wrench
Φ20.5 ~Φ20.9	KRUZ 205 □ FSL	25.0	T(3xD)	160	104	82	32	IDP 205, IDP 206, IDP 207, IDP 208, IDP 209	CS 200 -215 SL		M3x6	1.5mm
			P(5xD)	201	145	123						
			H(7xD)	242	186	164						
			L(10xD)	304	248	226						
Φ21.0 ~Φ21.4	KRUZ 210 □ FSL		T(3xD)	162	106	84		IDP 210, IDP 211, IDP 212, IDP 213, IDP 214				
			P(5xD)	204	148	126						
			H(7xD)	246	190	168						
			L(10xD)	309	253	231						
Φ21.5 ~Φ21.9	KRUZ 215 □ FSL		T(3xD)	165	109	86		IDP 215, IDP 216, IDP 217, IDP 218, IDP 219				
			P(5xD)	208	152	129						
			H(7xD)	251	195	172						
			L(10xD)	316	260	237						
Φ22.0 ~Φ22.4	KRUZ 220 □ FSL		T(3xD)	167	111	88		IDP 220, IDP 221, IDP 222, IDP 223, IDP 224				
			P(5xD)	211	155	132						
			H(7xD)	255	199	176						
			L(10xD)	321	265	242						
Φ22.5 ~Φ22.9	KRUZ 225 □ FSL	T(3xD)	169	113	90	IDP 225, IDP 226, IDP 227, IDP 228, IDP 229						
		P(5xD)	214	158	135							
		H(7xD)	259	203	180							
		L(10xD)	327	271	248							
Φ23.0 ~Φ23.4	KRUZ 230 □ FSL	T(3xD)	172	116	92	IDP 230, IDP 231, IDP 232, IDP 233, IDP 234						
		P(5xD)	218	162	138							
		H(7xD)	264	208	184							
		L(10xD)	333	277	253							
Φ23.5 ~Φ23.9	KRUZ 235 □ FSL	T(3xD)	174	118	94	IDP 235, IDP 236, IDP 237, IDP 238, IDP 239						
		P(5xD)	221	165	141							
		H(7xD)	268	212	188							
		L(10xD)	339	283	259							
Φ24.0 ~Φ24.4	KRUZ 240 □ FSL	T(3xD)	181	121	96	IDP 240, IDP 241, IDP 242, IDP 243, IDP244						
		P(5xD)	229	169	144							
		H(7xD)	277	217	192							
		L(10xD)	349	289	264							
Φ24.5 ~Φ24.9	KRUZ 245 □ FSL	T(3xD)	183	123	98	IDP 245, IDP 246, IDP 247, IDP 248, IDP 249						
		P(5xD)	232	172	147							
		H(7xD)	281	221	196							
		L(10xD)	355	295	270							
Φ25.0 ~Φ25.4	KRUZ 250 □ FSL	T(3xD)	185	125	100	IDP 250, IDP 251, IDP 252, IDP 253, IDP 254						
		P(5xD)	235	175	150							
		H(7xD)	285	225	200							
		L(10xD)	360	300	275							
Φ25.5 ~Φ25.9	KRUZ 255 □ FSL	T(3xD)	188	128	102	IDP 255, IDP 256, IDP 257, IDP 258, IDP 259						
		P(5xD)	239	179	153							
		H(7xD)	290	230	204							
		L(10xD)	367	307	281							
Φ26.0 ~Φ26.4	KRUZ 260 □ FSL	T(3xD)	190	130	104	IDP 260, IDP 261, IDP 262, IDP 263, IDP 264						
		P(5xD)	242	182	156							
		H(7xD)	294	234	208							
		L(10xD)	372	312	286							
Φ26.5 ~Φ26.9	KRUZ 265 □ FSL	T(3xD)	193	133	106	IDP 265, IDP 266, IDP 267, IDP 268, IDP 269						
		P(5xD)	246	186	159							
		H(7xD)	299	239	212							
		L(10xD)	379	319	292							
Φ27.0 ~Φ27.4	KRUZ 270 □ FSL	T(3xD)	195	135	108	IDP 270, IDP 271, IDP 272, IDP 273, IDP 274						
		P(5xD)	249	189	162							
		H(7xD)	303	243	216							
		L(10xD)	384	324	297							
Φ27.5 ~Φ27.9	KRUZ 275 □ FSL	T(3xD)	197	137	110	IDP 275, IDP 276, IDP 277, IDP 278, IDP 279						
		P(5xD)	252	192	165							
		H(7xD)	307	247	220							
		L(10xD)	390	330	303							
Φ28.0 ~Φ28.4	KRUZ 280 □ FSL	T(3xD)	200	140	112	IDP 280, IDP 281, IDP 282, IDP 283, IDP 284						
		P(5xD)	256	196	168							
		H(7xD)	312	252	224							
		L(10xD)	396	336	308							

Hole size range	Body Code No.	Shank Size(Φd)	Cutting depth (Length x ΦD)	L1	L2	L3	Flanged dia.(ΦFd)	Insert Code No. to fit in body	Cap Screw	Torx driver	Set Screw	L-wrench
Φ28.5 ~Φ28.9	KRUZ 285 □ FSL	32.0	T(3xD)	202	142	114	39	IDP 285, IDP 286, IDP 287, IDP 288, IDP 289	CS 280 -295 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	259	199	171						
			H(7xD)	316	256	228						
			L(10xD)	402	342	314						
Φ29.0 ~Φ29.4	KRUZ 290 □ FSL	32.0	T(3xD)	205	145	116	39	IDP 290, IDP 291, IDP 292, IDP 293, IDP 294	CS 280 -295 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	263	203	174						
			H(7xD)	321	261	232						
			L(10xD)	408	348	319						
Φ29.5 ~Φ29.9	KRUZ 295 □ FSL	32.0	T(3xD)	207	147	118	39	IDP 295, IDP 296, IDP 297, IDP 298, IDP 299	CS 280 -295 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	266	206	177						
			H(7xD)	325	265	236						
			L(10xD)	414	354	325						
Φ30.0 ~Φ30.4	KRUZ 300 □ FSL	32.0	T(3xD)	209	149	120	39	IDP 300, IDP 301, IDP 302, IDP 303, IDP 304	CS 300 -315 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	269	209	180						
			H(7xD)	329	269	240						
			L(10xD)	419	359	330						
Φ30.5 ~Φ30.9	KRUZ 305 □ FSL	32.0	T(3xD)	212	152	122	39	IDP 305, IDP 306, IDP 307, IDP 308, IDP 309	CS 300 -315 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	273	213	183						
			H(7xD)	334	274	244						
			L(10xD)	426	366	336						
Φ31.0 ~Φ31.4	KRUZ 310 □ FSL	32.0	T(3xD)	214	154	124	39	IDP 310, IDP 311, IDP 312, IDP 313, IDP 314	CS 300 -315 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	276	216	186						
			H(7xD)	338	278	248						
			L(10xD)	431	371	341						
Φ31.5 ~Φ31.9	KRUZ 315 □ FSL	32.0	T(3xD)	217	157	126	39	IDP 315, IDP 316, IDP 317, IDP 318, IDP 319	CS 300 -315 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	280	220	189						
			H(7xD)	343	283	252						
			L(10xD)	438	378	347						
Φ32.0 ~Φ32.4	KRUZ 320 □ FSL	32.0	T(3xD)	219	159	128	39	IDP 320, IDP 321, IDP 322, IDP 323, IDP 324	CS 300 -315 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	283	223	192						
			H(7xD)	347	287	256						
			L(10xD)	443	383	352						
Φ32.5 ~Φ32.9	KRUZ 325 □ FSL	32.0	T(3xD)	221	161	130	39	IDP 325, IDP 326, IDP 327, IDP 328, IDP 329	CS 300 -315 SL	T15 Torque 3.5Nm (Max)	M4x8	2.0mm
			P(5xD)	286	226	195						
			H(7xD)	351	291	260						
			L(10xD)	449	389	358						
Φ33.0 ~Φ33.4	KRUZ 330 □ FSL	32.0	T(3xD)	224	164	132	39	IDP 330, IDP 331, IDP 332, IDP 333, IDP 334	CS 300 -315 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	290	230	198						
			H(7xD)	356	296	264						
			L(10xD)	455	395	363						
Φ33.5 ~Φ33.9	KRUZ 335 □ FSL	32.0	T(3xD)	226	166	134	39	IDP 335, IDP 336, IDP 337, IDP 338, IDP 339	CS 300 -315 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	293	233	201						
			H(7xD)	360	300	268						
			L(10xD)	461	401	369						
Φ34.0 ~Φ34.4	KRUZ 340 □ FSL	40.0	T(3xD)	239	169	136	55	IDP 340, IDP 341, IDP 342, IDP 343, IDP 344	CS 320 -355 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	307	237	204						
			H(7xD)	375	305	272						
			L(10xD)	477	407	374						
Φ34.5 ~Φ34.9	KRUZ 345 □ FSL	40.0	T(3xD)	241	171	138	55	IDP 345, IDP 346, IDP 347, IDP 348, IDP 349	CS 320 -355 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	310	240	207						
			H(7xD)	379	309	276						
			L(10xD)	483	413	380						
Φ35.0 ~Φ35.4	KRUZ 350 □ FSL	40.0	T(3xD)	243	173	140	55	IDP 350, IDP 351, IDP 352, IDP 353, IDP 354	CS 320 -355 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	313	243	210						
			H(7xD)	383	313	280						
			L(10xD)	488	418	385						
Φ35.5 ~Φ35.9	KRUZ 355 □ FSL	40.0	T(3xD)	246	176	142	55	IDP 355, IDP 356, IDP 357, IDP 358, IDP 359	CS 320 -355 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	317	247	213						
			H(7xD)	388	318	284						
			L(10xD)	495	425	391						
Φ36.0 ~Φ36.4	KRUZ 360 □ FSL	40.0	T(3xD)	248	178	144	55	IDP 360, IDP 361, IDP 362, IDP 363, IDP 364	CS 360 -395 SL	T20 Torque 4.0Nm (Max)	M5x10	2.5mm
			P(5xD)	320	250	216						
			H(7xD)	392	322	288						
			L(10xD)	500	430	396						

Hole size range	Body Code No.	Shank Size(Φd)	Cutting depth (Length x ΦD)	L1	L2	L3	Flanged dia.(ΦFd)	Insert Code No. to fit in body	Cap Screw	Torx driver	Set Screw	L-wrench
Φ36.5 ~Φ36.9	KRUZ 365 □ FSL	40.0	T(3xD)	251	181	146	55	IDP 365, IDP 366, IDP 367, IDP 368, IDP 369	CS 360 -395 SL			
			P(5xD)	324	254	219						
			H(7xD)	397	327	292						
			L(10xD)	507	437	402						
Φ37.0 ~Φ37.4	KRUZ 370 □ FSL	40.0	T(3xD)	253	183	148	55	IDP 370, IDP 371, IDP 372, IDP 373, IDP 374	CS 360 -395 SL			
			P(5xD)	327	257	222						
			H(7xD)	401	331	296						
			L(10xD)	512	442	407						
Φ37.5 ~Φ37.9	KRUZ 375 □ FSL	40.0	T(3xD)	255	185	150	55	IDP 375, IDP 376, IDP 377, IDP 378, IDP 379	CS 360 -395 SL			
			P(5xD)	330	260	225						
			H(7xD)	405	335	300						
			L(10xD)	518	448	413						
Φ38.0 ~Φ38.4	KRUZ 380 □ FSL	40.0	T(3xD)	258	188	152	55	IDP 380, IDP 381, IDP 382, IDP 383, IDP 384	CS 360 -395 SL			
			P(5xD)	334	264	228						
			H(7xD)	410	340	304						
			L(10xD)	524	454	418						
Φ38.5 ~Φ38.9	KRUZ 385 □ FSL	40.0	T(3xD)	260	196	154	55	IDP 385, IDP 386, IDP 387, IDP 388, IDP 389	CS 360 -395 SL			
			P(5xD)	337	267	231						
			H(7xD)	414	344	308						
			L(10xD)	530	460	424						
Φ39.0 ~Φ39.4	KRUZ 390 □ FSL	40.0	T(3xD)	263	193	156	55	IDP 390, IDP 391, IDP 392, IDP 393, IDP 394	CS 360 -395 SL			
			P(5xD)	341	271	234						
			H(7xD)	419	349	312						
			L(10xD)	536	466	429						
Φ39.5 ~Φ39.9	KRUZ 395 □ FSL	40.0	T(3xD)	265	195	158	55	IDP 395, IDP 396, IDP 397, IDP 398, IDP 399	CS 360 -395 SL			
			P(5xD)	344	274	237						
			H(7xD)	423	353	316						
			L(10xD)	542	472	435						
Φ40.0 ~Φ40.4	KRUZ 400 □ FSL	40.0	T(3xD)	267	197	160	55	IDP 400, IDP 401, IDP 402, IDP 403, IDP 404	CS 400 -445 SL			
			P(5xD)	347	277	240						
			H(7xD)	427	357	320						
			L(10xD)	547	477	440						
Φ40.5 ~Φ40.9	KRUZ 405 □ FSL	40.0	T(3xD)	270	200	162	55	IDP 405, IDP 406, IDP 407, IDP 408, IDP 409	CS 400 -445 SL			
			P(5xD)	351	281	243						
			H(7xD)	432	362	324						
			L(10xD)	554	484	446						
Φ41.0 ~Φ41.4	KRUZ 410 □ FSL	40.0	T(3xD)	272	202	164	55	IDP 410, IDP 411, IDP 412, IDP 413, IDP 414	CS 400 -445 SL			
			P(5xD)	354	284	246						
			H(7xD)	436	366	328						
			L(10xD)	559	489	451						
Φ41.5 ~Φ41.9	KRUZ 415 □ FSL	40.0	T(3xD)	275	205	166	55	IDP 415, IDP 416, IDP 417, IDP 418, IDP 419	CS 400 -445 SL			
			P(5xD)	358	288	249						
			H(7xD)	441	371	332						
			L(10xD)	566	496	457						
Φ42.0 ~Φ42.4	KRUZ 420 □ FSL	40.0	T(3xD)	277	207	168	55	IDP 420, IDP 421, IDP 422, IDP 423, IDP 424	CS 400 -445 SL			
			P(5xD)	361	291	252						
			H(7xD)	445	375	336						
			L(10xD)	571	501	462						
Φ42.5 ~Φ42.9	KRUZ 425 □ FSL	40.0	T(3xD)	279	209	170	55	IDP 425, IDP 426, IDP 427, IDP 428, IDP 429	CS 400 -445 SL			
			P(5xD)	364	294	255						
			H(7xD)	449	379	340						
			L(10xD)	577	507	468						
Φ43.0 ~Φ43.4	KRUZ 430 □ FSL	40.0	T(3xD)	282	212	172	55	IDP 430, IDP 431, IDP 432, IDP 433, IDP 434	CS 400 -445 SL			
			P(5xD)	368	298	258						
			H(7xD)	454	384	344						
			L(10xD)	583	513	473						
Φ43.5 ~Φ43.9	KRUZ 435 □ FSL	40.0	T(3xD)	284	214	174	55	IDP 435, IDP 436, IDP 437, IDP 438, IDP 439	CS 400 -445 SL			
			P(5xD)	371	301	261						
			H(7xD)	458	388	348						
			L(10xD)	589	519	479						
Φ44.0 ~Φ44.4	KRUZ 440 □ FSL	40.0	T(3xD)	287	217	176	55	IDP 440, IDP 441, IDP 442, IDP 443, IDP 444	CS 400 -445 SL			
			P(5xD)	375	305	264						
			H(7xD)	463	393	352						
			L(10xD)	595	525	484						

Hole size range	Body Code No.	Shank Size(Φd)	Cutting depth (Length x ΦD)	L1	L2	L3	Flanged dia.(ΦFd)	Insert Code No. to fit in body	Cap Screw	Torx driver	Set Screw	L-wrench
Φ44.5 ~Φ44.9	KRUZ 445 □ FSL	40.0	T(3xD)	289	219	178	55	IDP 445, IDP 446, IDP 447, IDP 448, IDP 449	CS 400 -445 SL			
			P(5xD)	378	308	267						
			H(7xD)	467	397	356						
			L(10xD)	601	531	490						
Φ45.0 ~Φ45.4	KRUZ 450 □ FSL	40.0	T(3xD)	291	221	180	55	IDP 450, IDP 451, IDP 452, IDP 453, IDP 454	CS 450 -500 SL			
			P(5xD)	381	311	270						
			H(7xD)	471	401	360						
			L(10xD)	606	536	495						
Φ45.5 ~Φ45.9	KRUZ 455 □ FSL	40.0	T(3xD)	294	224	182	55	IDP 455, IDP 456, IDP 457, IDP 458, IDP 459	CS 450 -500 SL			
			P(5xD)	385	315	273						
			H(7xD)	476	406	364						
			L(10xD)	613	543	501						
Φ46.0 ~Φ46.4	KRUZ 460 □ FSL	40.0	T(3xD)	296	226	184	55	IDP 460, IDP 461, IDP 462, IDP 463, IDP 464	CS 450 -500 SL			
			P(5xD)	388	318	276						
			H(7xD)	480	410	368						
			L(10xD)	618	548	506						
Φ46.5 ~Φ46.9	KRUZ 465 □ FSL	40.0	T(3xD)	299	229	186	55	IDP 465, IDP 466, IDP 467, IDP 468, IDP 469	CS 450 -500 SL			
			P(5xD)	392	322	279						
			H(7xD)	485	415	372						
			L(10xD)	625	555	512						
Φ47.0 ~Φ47.4	KRUZ 470 □ FSL	40.0	T(3xD)	301	231	188	55	IDP 470, IDP 471, IDP 472, IDP 473, IDP 474	CS 450 -500 SL			
			P(5xD)	395	325	282						
			H(7xD)	489	419	376						
			L(10xD)	630	560	517						
Φ47.5 ~Φ47.9	KRUZ 475 □ F SL	40.0	T(3xD)	303	233	190	55	IDP 475, IDP 476, IDP 477, IDP 478, IDP 479	CS 450 -500 SL			
			P(5xD)	398	328	285						
			H(7xD)	493	423	380						
			L(10xD)	636	566	523						
Φ48.0 ~Φ48.4	KRUZ 480 □ FSL	40.0	T(3xD)	306	236	192	55	IDP 480, IDP 481, IDP 482, IDP 483, IDP 484	CS 450 -500 SL			
			P(5xD)	402	332	288						
			H(7xD)	498	428	384						
			L(10xD)	642	572	528						
Φ48.5 ~Φ48.9	KRUZ 485 □ FSL	40.0	T(3xD)	308	238	194	55	IDP 485, IDP 486, IDP 487, IDP 488, IDP 489	CS 450 -500 SL			
			P(5xD)	405	335	291						
			H(7xD)	502	432	388						
			L(10xD)	648	578	534						
Φ49.0 ~Φ49.4	KRUZ 490 □ FSL	40.0	T(3xD)	311	241	196	55	IDP 490, IDP 491, IDP 492, IDP 493, IDP 494	CS 450 -500 SL			
			P(5xD)	409	339	294						
			H(7xD)	507	437	392						
			L(10xD)	654	584	539						
Φ49.5 ~Φ49.9	KRUZ 495 □ FSL	40.0	T(3xD)	313	243	198	55	IDP 495, IDP 496, IDP 497, IDP 498, IDP 499	CS 450 -500 SL			
			P(5xD)	412	342	297						
			H(7xD)	511	441	396						
			L(10xD)	660	590	545						
Φ50.0 ~Φ50.4	KRUZ 500 □ FSL	40.0	T(3xD)	315	245	200	55	IDP 500, IDP 501, IDP 502, IDP 503, IDP 504	CS 450 -500 SL			
			P(5xD)	415	345	300						
			H(7xD)	515	445	400						
			L(10xD)	665	595	550						

KRUZ-FSL Drills, Cutting Speed Recommendation

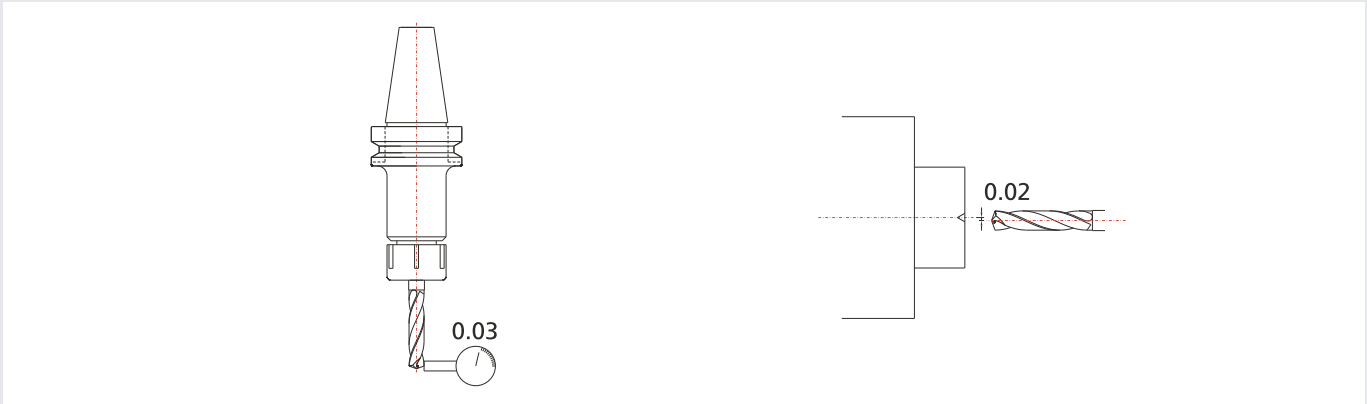
Drill Dia. Condition Material Group	Φ8~16mm		Φ16~25mm		Φ25~32mm		Φ32~40mm		Φ40~50mm	
	Speed (m/min)	Feed (mm/rev)	Speed (m/min)	Feed (mm/rev)	Speed (m/min)	Feed (mm/rev)	Speed (m/min)	Feed (mm/rev)	Speed (m/min)	Feed (mm/rev)
Grey cast iron (FC)	80~150	0.20~0.30	80~150	0.25~0.45	80~160	0.35~0.55	90~200	0.34~0.58	90~200	0.38~0.60
Nodular cast iron (FCD)	80~140	0.15~0.25	80~140	0.22~0.45	80~150	0.32~0.52	90~160	0.35~0.62	90~200	0.38~0.60
Carbon steel (S45C)	80~140	0.15~0.30	80~140	0.16~0.40	80~150	0.20~0.40	80~150	0.22~0.48	80~160	0.25~0.54
Alloy steel (SCM440)	70~140	0.15~0.30	70~140	0.15~0.40	70~140	0.18~0.40	80~140	0.25~0.47	80~140	0.27~0.52
Hardened steel (SKD11)	40~50	0.10~0.20	40~50	0.12~0.28	40~50	0.16~0.35	40~60	0.20~0.38	40~60	0.22~0.42
Stainless steel (SUS)	30~40	0.10~0.20	35~50	0.10~0.22	35~50	0.15~0.28	40~55	0.18~0.30	40~55	0.22~0.32
Aluminum 130HB (AL)	120~200	0.20~0.30	120~200	0.25~0.40	120~200	0.30~0.45	120~200	0.30~0.45	120~200	0.30~0.50

☞ This data is recommended for 3xDia. And should be reduced about 15~20% for 5xD, 7xD, 10xD drills.

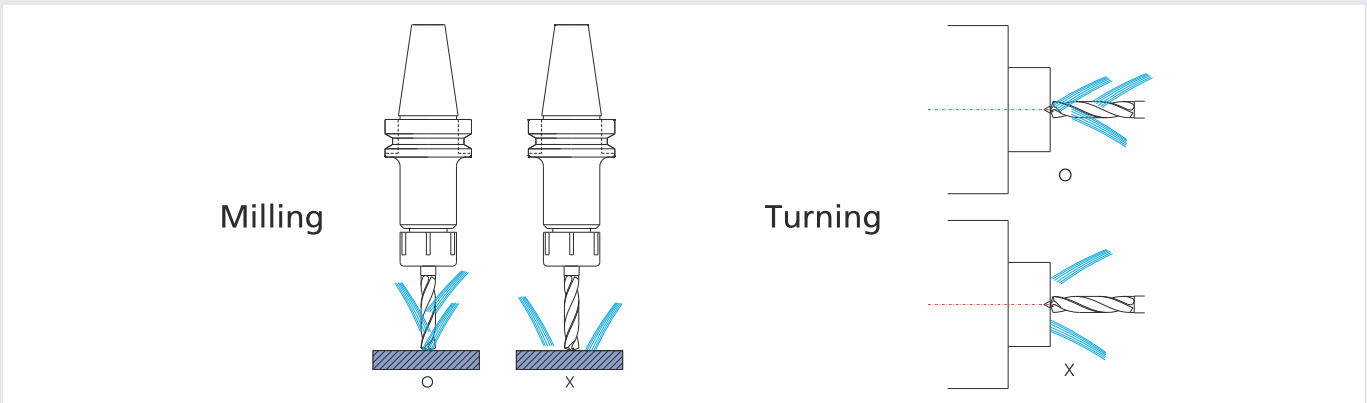
☞ The data is normally suggested for oil-mist(MQL) coolant condition and also possible to run in other normal condition if machining environment like clamping etc. are secured in good .

Concentricity

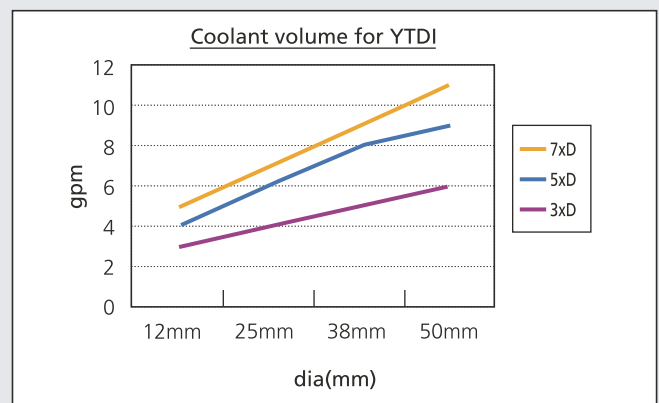
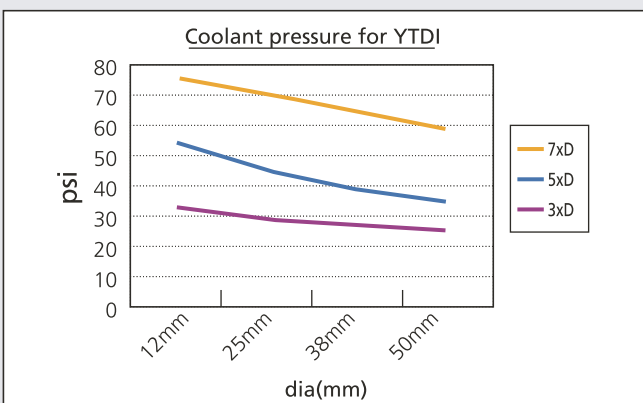
► To achieve the tolerance required or eliminate trouble, total run out between the center line of tool and workpiece must not exceed the below value.



External coolant supply



Internal Coolant supply



Coolant Pressure(psi) for YTDI drill

	12mm	25mm	38mm	50mm
3xD	33	29	27	25
5xD	54	45	39	35
7xD	75	70	64	59

Coolant Volume(gpm) for YTDI drill

	12mm	25mm	38mm	50mm
3xD	3	4	5	6
5xD	4	6	8	9
7xD	5	7	9	11

Major Cutting speed formula

Cutting Speed

$$V = \frac{\pi \times D \times N}{1000} \text{ (m/min)}$$

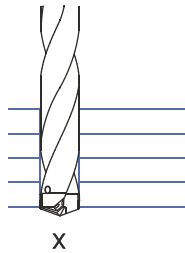
- V : Cutting speed (m/min)
- D : Drill diameter (mm)
- N : Revolution per minute (rpm)
- π : Circular constant (3.14)

Feed

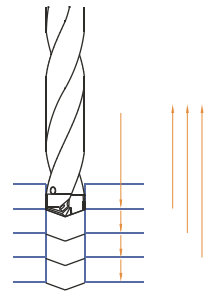
$$f = \frac{F}{N} \text{ (mm/rev)}$$

- f : Feed rate (mm/rev)
- F : Depth of cut per minute (mm/min)
- N : Revolution per minute (rpm)

Recommended application for stacked plate by Yes Carbide Drills

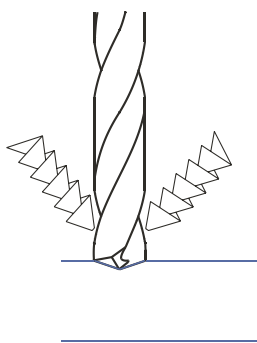


One operation is possible subject to closely tightend stacked plate without any room.

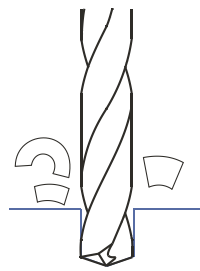


"Woodpecker" method recommended in case of certain aperture in the stacked plate.

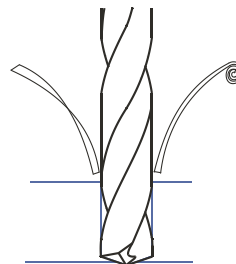
Good chip formation



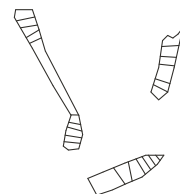
(initial drilling)



(drilling through)



(bottoming)



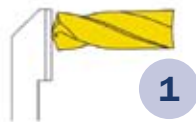
(long Stringy chip)

YES KRUZ FSL can be resharpened by CNC 5 axis machine or Universal tool grinder with our own special attachment. The below procedure is to regrind by Universal tool grinder, while following “S” point program in case of CNC machine.

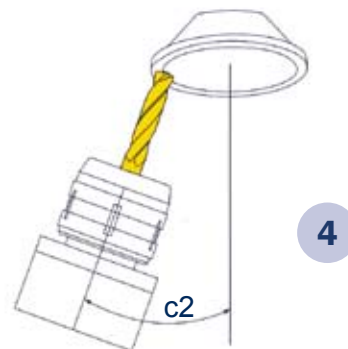
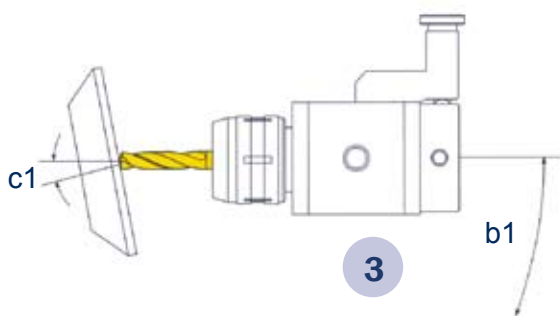
Removal of worn section

Remove all of the worn or chipped section before regrinding.

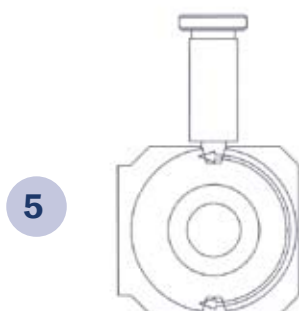
Regrinding drill point



1. Put the drill point horizontally on the stopper. (See 1.1)
2. Set dial gauge and turn the drill to coincide central line of point. Then, tighten the collect chuck securely. (See 1.2)



3. Set the cutting edge toward grinding wheel to the point angle $\langle c1, 8^\circ \rangle$ as shown (1.3). Then keep the angle $\langle c2, 20^\circ \rangle$ as shown (1.4)
4. Grind the flank up and down repeatedly as shown $\langle b1 \rangle$.



5. Move forward the grinding wheel and grind the cutting lips, after keeping the attachment horizontally.
6. Rotate the attachment at 180° toward $\langle c3 \rangle$ and grind other cutting edge by the same procedure as No. 4 & 5. (See 1.5) Make sure that both cutting lips should be equal or symmetrical.

Power requirement for YES Carbide Drills

$$\text{Power(P)} = \frac{D \times f \times V \times k_s}{24,480 \times 0.7} \text{ (kw)}$$

ex)

$$\text{Power(P)} = \frac{11.5 \times 0.2 \times 60 \times 230}{24,480 \times 0.7} = 1.852 \text{kw}$$

- D = drill diameter (mm)
- f = feed (mm/rev)
- V = cutting speed (mm/min)
- ks = specific cutting force (kg/mm)
- ? = constants of performance(0.7~0.85)

• Specific cutting force (ks)

Material		Condition	HB	ks(kg/mm)
Steel	Unalloyed steel	C = 0.15%	100~150	195
		C = 0.35%	120~180	215
		C = 0.60%	200~250	230
	Low alloy steel	Non hardened	120~200	215
		Hardened & Tempered	250~300	265
		Hardened & Tempered	300~350	290
	High alloy steel	Annealed	150~250	265
		Hardened	300~350	290
	Stainless steel	Martensitic/ ferritic	175~225	235
		Austenitic	150~200	250
	Steel casting	Unalloyed	150~200	205
		Low alloyed	175~225	255
High alloyed		200~250	275	
Hard steel	Hardened steel	HRc 55	460	
Cast iron	Grey casting iron	Low tensile strength	150~225	110
		High tensile strength	200~300	150
	Malleable cast iron		110~250	115
	Nodular cast iron	Ferritic	125~200	115
		Pearlitic	200~300	185
Chilled cast iron		350~450	310	
Non ferrous	Aluminium alloys	Non heat treatable	40~80	50
		Heat treatable	80~120	80
	Aluminium alloys,Cast	Non heat treatable	50~100	80
		Heat treatable	65~115	95
	Copper alloys	Brass	65~115	80
		Bronze	75~115	180

Problem		Cause	Remedy
Cutting edge wear	Flank wear	Excessive cutting speed	Reduce cutting speed
	Edge chipping	Vibration or chattering in machine tool, holder or component	Check and adjust machine and tool alignment
		Deflection of tool, part, fixture or machine	Check all rigidity
		Excessive cutting speed	Reduce cutting speed
		Off center set up	Check concentricity not to exceed 0.02mm TIR
	Corner chipping	Excessive cutting speed	Reduce cutting speed
		Insufficient coolant supply	Increase coolant pressure
	Built up edge	Insufficient cutting speed	Increase cutting speed
		Insufficient coolant supply	Increase coolant pressure
		Worn cutting edge	Regrind or replace new drill
	Margin	Improper seating of tool	Check and adjust machine spindle, and fixture
		Rough or angled entry/exit of hole	Reduce feed
		Chip clogging or jamming	Increase coolant pressure and adjust feed to optimize chip-formation
		Insufficient coolant supply	Increase coolant pressure
		Excessive cutting speed	Reduce cutting speed
Long stringy chips	Improper speed and feed	Adjust speed and feed	
Tool life too short	Flank wear increase too fast	Reduce cutting speed	
Drill breakage	Off center set up	Check set up rigidity of machine, tool, and fixture	
	Improper cutting condition	Check cutting parameters, possibly reduce feed	
Burrs on exit	Excessive axial force	Reduce the width of edge preparation	
Oversize hole	Improper cutting condition	Check cutting data, increase cutting speed	
	Clamping chuck	Check fit and clamping of tool	
Undersize hole	Tool cooling	Check coolant fluid	
	Improper cutting condition	Reduce cutting speed, increase feed	



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